CLAIMS

What is claimed is:

1. An organic electronic device comprising at least one photoactive layer and at least one hole injection/transport layer, wherein one or more of the at least one photoactive layer is a solution-processed organic electroactive material, wherein said solution-processed organic electroactive material has been heat-treated.

2. An organic electronic device comprising at least one photoactive layer and at least one hole injection/transport layer, wherein:

one or more of the at least one photoactive layer is a first solution-processed organic electroactive material;

one or more of the at least one buffer layer is a second solution-processed organic electroactive material; and

wherein at least one of said first solution-processed organic electroactive material and said second solution-processed organic electroactive material has been heat-treated.

3. An organic electronic device comprising at least one electron injection/transport layer and at least one hole injection/transport layer, wherein:

one or more of the at least one one hole injection/transport layer is a second solution-processed organic electroactive material;

one or more of the at least one electron injection/transport layer is a third solution-processed organic electroactive material; and

wherein at least one of said second solution-processed organic electroactive material, and said third solution-processed organic electroactive material has been heat-treated.

4. The device of Claim 3, wherein one or more of the second solution-processed organic electroactive material has been heat-treated.

5. The device of Claim 3, wherein one or more of the third solution-processed organic electroactive material has been heat-treated.

6. The device of 3 wherein one or more of the second solution-processed organic electroactive material has been heat-treated.at a temperature and for a period which results in at least a doubling of resistance of the hole injection/transport layer.

7. The device of 3 wherein the hole injection/transport layer has been heat-treated at a temperature and for a period which results in a conductivity of less than 10^{-6} S/cm.

8. The device of 4 wherein the second solution-processed organic electroactive material is polyaniline.

9. The device of 4 wherein the second solution-processed organic electroactive material is polyaniline in the emeraldine salt form.

10. The device of 3 wherein the hole injection/transport layer has been heat-treated at a temperature of from about 100°C to about 300°C for a time period of from about 0.5 minutes to about 90 minutes.

11. The device of claim 2 wherein the photoactive layer has been heat-treated.

12. The device of Claim 2, wherein the photoactive layer has been heat-treated at a temperature and for a period which results in an increase in diode operating life of at least about 50%.

13. The device of Claim 2, wherein the first solution-processed electroactive material is an electroluminescent conjugated organic polymer.

14. The device of Claim 2, wherein the photoactive layer has been heat-treated at a temperature of from about 80°C to about 250°C for a time period of from about 1 minute to about 3 minutes.

15. A polymer light-emitting diode comprising in serial order an electron-injecting layer, an emissive polymer layer, a conductive buffer layer comprising conductive conjugated organic polymer that has been heat-treated at a temperature and of a period which results in a conductivity of less than 10^{-6} S/cm.

16. A polymer light-emitting diode comprising in serial order an electron-injecting layer, an emissive polymer layer that has been heat-treated, a conductive buffer layer comprising conductive conjugated organic polymer.

17. A method for preparing a organic electronic device comprising the steps of:

a. depositing a conductive electrical contact layer on a solid substrate,

b. depositing a buffer layer comprising a solution-processed organic electroactive material on said conductive electrical contact layer,

c. heat-treating said buffer layer,

d. depositing an photoactive layer onto the heat-treated buffer layer, and

e. depositing an electron-injecting layer onto the photoactive layer.

18. The method of claim 17 wherein the heat-treating is at a temperature and for a period which results in a conductivity of the buffer layer of less than 10^{-6} S/cm.

19. The method of claim 17 wherein the solution-processed organic electroactive material is polyaniline.

20. The method of claim 17 wherein the solution-processed organic electroactive material is polyaniline in the emeraldine salt form.

21. The method of claim 17 wherein the heat-treating is carried out at a temperature of from about 100°C to about 300°C for a time period of from about 0.5 minutes to about 90 minutes.

22. A method for making an organic electronic device comprising the steps of:

a. depositing a conductive electrical contact layer on a solid substrate,

b. optionally depositing a buffer layer comprising conductive conjugated organic polymer on said conductive electrical contact layer,

c. depositing an photoactive layer on said buffer layer,

d. heat-treating said photoactive layer and the buffer layer, and

e. depositing an electron-injecting layer onto the heat-treated photoactive layer.

23. The method of claim 22 wherein the emissive polymer layer is heat-treated at a temperature and for a period which results in an increase in diode operating life of at least about 50%.

24. The method of claim 22 wherein the emissive polymer layer comprises an electroluminescent conjugated organic polymer.

25. The method of claim 22 wherein the emissive polymer layer is heat-treated at a temperature of from about 80°C to about 250°C for a time period of from about 1 minute to about 3 minutes.

26. A method for preparing an organic electronic device comprising the steps of:

a. depositing a conductive electrical contact layer on a solid substrate,

b. optionally depositing a buffer layer comprising solution-processed organic electroactive material on said conductive electrical contact layer,

c. optionally heat-treating said buffer layer,

d. depositing an photoactive layer onto the heat-treated buffer layer,

e. heat-treating the photoactive layer, and

f. depositing an electron-injecting layer onto the photoactive layer.

27. The method of claim 26 wherein the heat-treating of the buffer is at a temperature and for a period which results in a conductivity of the buffer layer of less than 10-6 S/cm.

28. The method of claim 25 wherein the solution-processed organic electroactive material is polyaniline.

29. The method of claim 26 wherein the solution-processed organic electroactive material is polyaniline in the emeraldine salt form.

30. The method of claim 26 wherein the heat-treating of the buffer layer is carried out at a temperature of from about 100°C to about 300°C for a time period of from about 0.5 minutes to about 90 minutes.

31. A method for making an organic electronic device comprising the steps of:

a. depositing a conductive electrical contact layer on a solid substrate,

b. optionally depositing a buffer layer comprising solution-processed organic electroactive material on said conductive electrical contact layer,

c. depositing an photoactive layer onto the heat-treated buffer layer, and

d. depositing an electron-injecting layer onto the emmisive layer, and

e. heat treating the resulting structure.

32. A method of claim 31 wherein the heat-treating of the buffer is at a temperature and for a period which results in a conductivity of the buffer layer of less than 10^{-6} S/cm.

33. The method of claim 31 wherein the solution-processed organic electroactive material is polyaniline.

34. The method of claim 31 wherein the solution-processed organic electroactive material is polyaniline in the emeraldine salt form.

35. The method of claim 31 wherein the heat-treating of the buffer layer is carried out at a temperature of from about 100°C to about 300°C for a time period of from about 0.5 minutes to about 90 minutes.

36. A method for making an organic electronic device comprising the steps of:

a. depositing an electron-injecting layer onto a solid substrate,

b. depositing an photoactive layer onto the electron-injecting layer,

c. heat-treating said photoactive layer,

d. optionally depositing a buffer layer comprising solution-processed organic electroactive material on the heat-treated photoactive layer, and

e. depositing a hole-injecting layer onto the optional buffer layer where present or on the heat-treated photoactive layer.

37. A method for preparing an organic electronic device comprising the steps of:

a. depositing an electron-injecting layer onto a solid substrate,

b. depositing an photoactive layer onto the electron-injecting layer

c. optionally depositing a buffer layer comprising solution-processed organic electroactive material on the photoactive layer,

d. optionally heat-treating said buffer layer, and

e. depositing a hole-injecting layer onto the optional buffer layer where present or the photoactive layer.

38. A method for making an organic electronic device comprising the steps of:

a. depositing an electron-injecting layer onto a solid substrate,

b. depositing an photoactive layer onto the electron-injecting layer

c. heat-treating said photoactive layer,

d. depositing a buffer layer comprising solution-processed organic electroactive material on the heat-treated photoactive layer,

e. heat-treating the buffer layer, and

depositing a hole-injecting layer onto the heat-treated buffer layer.

39. A method for making an organic electronic device containing a first electrode, a second electrode, and at least one electroactive layer between the first and second electrodes, the steps comprising:

a. providing the first electrode;

b. providing the at least one electroactive layer, one or more of said at least one electroactive layer is a solution-processed organic electroactive layer;

c. heat-treating one or more of the solution-processed electroactive layer; and

d. providing the second electrode.

40. The device of claim 1, wherein the device is a photoconductive cell.

41. The device of claim 1, wherein the device is a photoresistive cell.

42. The device of claim 1, wherein the device is a photoswitch.

43. The device of claim 1, wherein the device is a transistor.

44. The device of claim 1, wherein the device is a photodetecting device.

45. The device of claim 1, wherein the device is a photovoltaic cell.

46. The device of claim 1, wherein the device is a capacitor.

47. The device of claim 1, wherein the device is a resistor.

48. The device of claim 1, wherein the device is a chemoresistive sensor.

49. The device of claim 1, wherein the device is a writing sensor.

50. The device of claim 1, wherein the device is an electrochromic device.